

Miniaturized, High Flow, Low Dead Volume Preconcentrator for Trace Contaminants in Water under Microgravity Conditions, Phase II

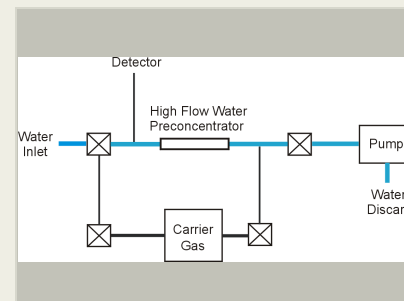
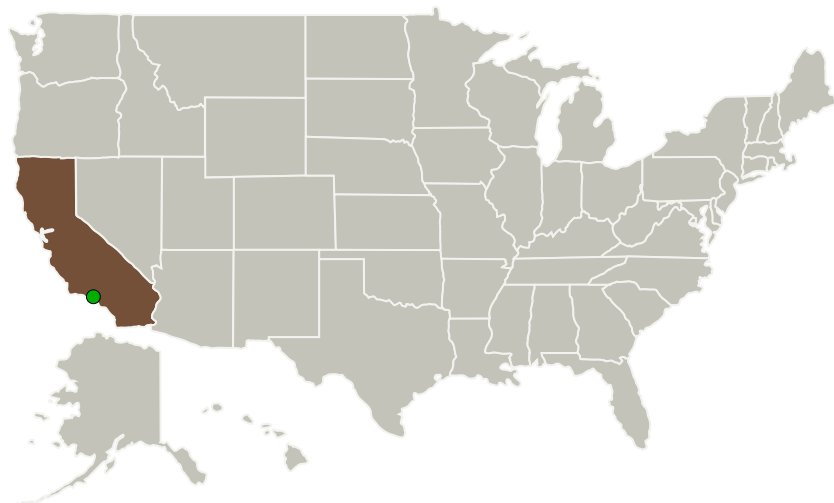
Completed Technology Project (2014 - 2016)



Project Introduction

Thorleaf Research, Inc. has demonstrated feasibility in Phase I and now proposes a Phase II effort to develop a miniaturized high flow, low dead-volume preconcentrator for monitoring trace levels of contaminants in liquid water under microgravity conditions. Our innovative design for the preconcentrator combines high water sampling flow rates with low dead volume, thus enhancing preconcentration. This is designed to meet monitoring needs for NASA's Spacecraft Water Exposure Guidelines (SWEGs) and addresses a key technology gap for long-duration human spaceflight, since standard techniques will not function without gravitation to stabilize phase boundaries. Human exploration of the solar system will depend on such technology, since water must be recycled and the option of returning grab samples to Earth for analysis from beyond low-Earth orbits does not exist. During Phase II, we plan to incorporate this technology into a miniaturized water preconcentrator module. Based on our Phase I results we project that it will be possible to develop this module with a mass of about 0.5 kg and average power consumption of <1 watt.

Primary U.S. Work Locations and Key Partners



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| Organizations Performing Work | Role | Type | Location |
|----------------------------------|-------------------------|-------------|---------------------------|
| Thorleaf Research, Inc. | Lead Organization | Industry | Santa Barbara, California |
| ● Jet Propulsion Laboratory(JPL) | Supporting Organization | NASA Center | Pasadena, California |

Primary U.S. Work Locations

California

Project Transitions

▶ **April 2014:** Project Start

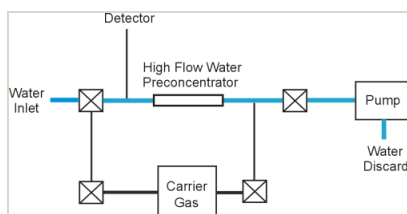
✓ **April 2016:** Closed out

Closeout Summary: Miniaturized, High Flow, Low Dead Volume Preconcentrator for Trace Contaminants in Water under Microgravity Conditions, Phase II Project Image

Closeout Documentation:

- Final Summary Chart Image(<https://techport.nasa.gov/file/137451>)

Images



Briefing Chart Image

Miniaturized, High Flow, Low Dead Volume Preconcentrator for Trace Contaminants in Water under Microgravity Conditions, Phase II (<https://techport.nasa.gov/image/128257>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Thorleaf Research, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

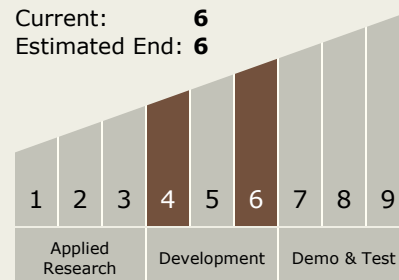
Carlos Torrez

Principal Investigator:

Paul Holland

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.4 Environmental Monitoring, Safety, and Emergency Response
 - └ TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System